Cancer (medicine), new growth of tissue resulting from a continuous proliferation of abnormal cells that have the ability to invade and destroy other tissues. Cancer, which may arise from any type of cell and in any body tissue, is not a single disease but a large number of diseases classified according to the tissue and type of cell of origin. Several hundred such classes exist, constituting three major subtypes:

Sarcomas arise from connective and supportive tissue, such as bone, cartilage, nerve, blood vessel, muscle, and fat.
Carcinomas, which include the most frequently occurring forms of human cancer, arise from epithelial tissue, such as the skin and the lining of the body cavities and organs, and the glandular tissue of the breast and prostate. Carcinomas with a structure resembling skin are termed squamous cell carcinomas. Those that resemble glandular tissue are called adenocarcinomas.
Leukemias and *lymphomas* include the cancers that involve blood-forming tissue and are typified by the enlargement of the lymph nodes, the invasion of the spleen and bone marrow, and the overproduction of immature white cells.

Nature of the Disease

A cancerous growth, or neoplasm, is *clonal*—that is, all its cells are descendants of a single cell. These cells have escaped the control of the normal forces regulating cellular growth. Resembling embryonic cells, they are unable to differentiate or mature into an adult, functioning state. As these cells multiply, they may form a mass called a tumor, which enlarges and continues to grow without regard to the function of the tissue of origin.

Tumors

Almost all cancers form tumors, but not all tumors are cancerous, or malignant; the greatest number are benign. Benign tumors are characterized by entirely localized growth and are usually separated from neighboring tissue by a surrounding capsule. Benign tumors generally grow slowly, and in structure closely resemble the tissue of origin. In some instances they may endanger the patient by obstructing, compressing, or displacing neighboring strucures, as in the brain. A few benign tumors, such as polyps of the colon, may be precancerous.

Invasion and Spreading

The most significant attribute of malignant tumors is their ability to spread beyond the site of origin. Cancer may invade neighboring tissues by direct extension or infiltration, or it may disseminate to distant sites, forming secondary growths known as *metastases.* The routes and sites of metastases vary with different primary cancers:

(1) When a cancer extends through the surface of the organ of origin into a cavity, cells may break away from the surface and implant on the surface of adjacent organs.

(2) Tumor cells may migrate into the lymphatic channels and be carried to the draining lymph nodes, or they may penetrate the blood vessels. Once in the bloodstream, the tumor cells are carried to the point at which the vessels become too small for the large tumor cells to pass. Cells from tumors of the gastrointestinal tract will be stopped in the liver. Later they may go on to the lungs. Cells from all other tumors will go to the lungs before being carried to other organs. The lungs and liver are therefore common sites of metastases.

(3) Many cancers tend to shed cells into the bloodstream early in their course. Most such cells die in the bloodstream, but some lodge against the surface and penetrate the wall into the tissue. A few may

Cancer Control

The most important preventive measure in controlling cancer is stopping tobacco use, which is the cause of 30 percent of all deaths from cancer. A large reduction might follow better diet: optimal calorie intake to avoid obesity, reduction of calories from fat to 20 percent of the diet (about half of the current U.S. intake), reduction of red-meat intake, and increased intake of dietary fiber (whole grain, fruits, and vegetables) and protective foods (foods that contain vitamins C and A, as well as such cruciferous vegetables as cabbage, cauliflower, broccoli, and Brussels sprouts). Moderation in eating salt-cured, smoked, and nitrite-cured foods and in the consumption of alcohol is also advised. Avoiding exposure to sunlight and the routine use of sunscreens is important to prevent cancer of the skin.

The environment can be improved by the elimination of carcinogenic chemicals from the workplace and the home, by the elimination of exposure to asbestos fiber dust, and by the reduction of excess radon accumulation in homes.

Effective screening is available for cancer of the cervix, breast, colon, rectum, and prostate. People without symptoms should have a cancer-related checkup every three years from age 20 to 40 and every year after 40. Women past 20 should do breast self-examination every month and have a breast examination and pelvic examination yearly. A mammogram should be done between age 35 and 39, every one or two years from 40 to 49, and yearly thereafter, although recent studies suggest that mammograms may not benefit women under 50. Women who are sexually active or have reached the age of 18 should have a *Pap test* (*see* GYNECOLOGY) yearly for three negative tests and less frequently thereafter. A digital rectal exam should be done every year after age 40 and a stool blood test every year after 50. A flexible proctoscopy should be done annually for two negative examinations and then every 3 to 5 years. Young men should do monthly self-examinations of the testes.

Widespread adoption of these measures could virtually eliminate lung cancer, reduce the incidence of breast and colon cancer, and assure a high rate of cure of cancers of the breast, colon, rectum, cervix, and prostate. Such measures, together with full use of present technology for diagnosis and treatment, may permit the achievement of the goal, announced in 1985, of a 50-percent reduction in cancer deaths in the United States by the year 2000.

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Further Reading